the vision and hearing of every child under their care. It is manifest that "the more the teacher knows about the health of the children entrusted to him, the simpler and easier will the work of medical inspection become" (p 61). We therefore suggest cooperation between the teacher and doctor in the manner indicated.

The above quotations and remarks will amply serve to show the general interest of Dr. Mackenzie's little volume. It is true that three of the four chapters, entitled "The Hygiene of School Life," "Normal Growth in the School Ages," "Medical Examination and Supervision of Schools and School Children," contain much that has been written of, if perhaps less attractively, before. But the remaining chapter, "The School Doctor in Germany," and the appendices on "Re-vaccination of School Children in Germany" and on "The Plan of a German Elementary School," traverse comparatively unfamiliar ground, and well deserve the attention of the serious student.

C. S. M.

ELEMENTARY PHYSICS.

(1) *Exercises in Physics for the Use of Schools.* By J. H. Leonard and W. H. Salmon. Pp. vii+116. (London: J. Murray, 1906.) Price 1*s.*

(2) *Introductory Practical Physics.* By W. F. Barrett and W. Brown. New edition. Part i. Pp. xii+284. (London: Simpkin, Marshall and Co., Ltd.; Dublin: Sealy, Bryers and Walker.)

(3) *Heat, Light, and Sound: an Introductory Course of Practical Exercises.* By J. R. Ashworth. Pp. xv+120. (London: Whittaker and Co., 1906.) Price 2*s.* net.

(4) *Light for Intermediate Students.* By F. E. Rees. Pp. viii+166. (London: J. M. Dent and Co., 1906.)

(5) *The Tutorial Physics.* Vol. iii. *A Text-book of Light.* By Dr. R. Wallace Stewart. Fourth edition. Revised by J. Satterley. Pp. viii+346. (Cambridge: University Tutorial Press, Ltd., 1906.) Price 4*s.* 6*d.*

(6) *The Elements of Physics.* By S. E. Coleman. Pp. vii+439. (Boston: D. C. Heath and Co., 1906.) Price 3*s.* 6*d.*

(7) *Physics—Theoretical and Descriptive.* By H. C. Cheston, J. S. Gibson, and C. E. Timmerman. Pp. xvi+373. (Boston: D. C. Heath and Co., 1906.) Price 3*s.* 6*d.*

(8) *A First-year Course of Practical Magnetism and Electricity.* By Dr. P. E. Shaw. Pp. vii+66. (London: *Electrician* Printing and Publishing Co., Ltd., n.d.) Price 2*s.* 6*d.* net.

(1) A GRADUATED collection of simple arithmetical exercises in physics, including mensuration, mechanics and hydrostatics, which will prove useful for school classes. No examples are given on heat conductivity. Answers are furnished.

(2) This text-book will be found useful for both elementary and advanced students. The volume deals with general physics, and the experiments described cover a wide range. They include measurements of length, area, volume, time, and mass; experiments on fluid pressure; measurement of force; mechanical properties of solids and liquids; molecular properties of fluids. The method of carrying out each experiment is briefly described, and an example is worked out in illustration. Theoretical considerations are generally avoided, but many references are given to text-books or original sources, so that a student may obtain further information if he desires. With such a wide range of subjects in so small a book, the treatment is often scant in places, *e.g.* the planimeter is dismissed without any mention of the datum circle. On p. 147 it is not at all clear how the mean value of Poisson's ratio is obtained from the recorded data. In the experimental proof of Boyle's law, one is told first to adjust the mercury to the same level in each limb of the tube; this very tedious operation is hardly necessary. There is little meaning in the statement on p. 123 that the value of g determined by simple pendulum experiments is 0·12 per cent. greater than the true value.

(3) Dr. Ashworth's book comprises a course of laboratory experiments in heat, light, and sound for first-year students. The plan adopted with each exercise is to give a list of the apparatus necessary, a short description of the method of carrying out the experiment, and a typical example to show how results are to be recorded in the note-book. It is to be regretted that these examples are not always well chosen. In the experiments on calorimetry, the temperature changes produced are often too small for measurement with any degree of accuracy by elementary students. There is little to be gained by comparing 78·9, the determined value of the latent heat of water, with an accepted value of 79·3 when the temperature change in the calorimeter is $5^{\circ}{\cdot}5$ C. The example on the determination of the refractive index of glass, by tracing the ray through a slab, is bad. Measured lengths of perpendiculars from the incident and refracted rays on the normal vary from 0·5 cm. to 1·0 cm., and the mean value of the refractive index is stated as 1·52. A further illustration is afforded in an experiment to investigate the relation between the time of vibration of a spring of constant length with varying load. Recorded periods are 0·54 and 0·64 second; their ratio 1·185. The ratio of the square roots of the corresponding masses is given as 1·183, and the error is stated as 0·2 per cent.

(4) This little book is intended by the author for students with some previous knowledge of experimental optics. The subject-matter covered, however, is very elementary, and the treatment is rather formal and meagre. Two chapters, devoted to intrinsic brightness and photometry, are very clear, and will serve as a useful introduction to more advanced works on photometry. Two excellent photographs of models taken with a pin-hole camera are furnished by Mr. Andrew Stephenson, and a graphical proof of the minimum deviation position is due to him. Lens and mirror formulæ are derived in the ordinary way. The curvature method for obtaining these formulæ is not introduced, and no mention is made of the term "power of a lens." The book is attractive in appearance, and many students will probably find it useful for revision purposes.

© 1907 Nature Publishing Group

(5) The revised and enlarged edition of Stewart's "Light" contains a very full treatment of the elements of geometrical optics. The inclusion of a large number of simple practical experiments enhances the value of the volume considerably. Dispersion and spectrum analysis receive a fuller treatment than in the previous edition. The book will prove distinctly useful.

(6) An introductory text-book of theoretical physics, the subject-matter having been selected with reference primarily to its value as part of a general education. Problems are interspersed at frequent intervals, and some of these are well designed to make a student think. A great deal of care has been exercised in the compilation of this book.

(7) This text-book of physics, which includes mechanics, heat, light and sound, electricity and magnetism, has been written for pupils in the American high schools. The statements are concise, and the diagrams clear. It is thoroughly up to date, and will prove a very suitable introductory course, especially if, as the author intends, laboratory work is carried out at the same time.

(8) The author in his preface intends this book for that class of technical students who are ignorant of the rudiments of algebra, geometry, trigonometry, and mechanics. The book includes three introductory exercises, six exercises on magnetism, and twenty-six on current electricity and its applications. There is very little in the method of treatment to distinguish it from other elementary text-books of practical electricity and magnetism. It is doubtful whether a student will draw a correct idea as to what determines a spark in air from the statement on p. 30:—

"Join 1 ft. of copper wire to one terminal (of a Leclanche cell) and brush the other terminal with the free end of the wire. No spark is seen because the E.M.F. of the cell is only about 1·3 volts and the resistance is high, so the maximum current is very small."

And on p. 32 (repetition with storage cell):—

"The E.M.F. is about 2 volts, and the resistance is very small, so the maximum current is large. Sparking is abundantly shown."

No thoughtful teacher would instruct a student to count the number of vibrations a magnet makes in a given time, as in the experiment described on p. 13. Elementary electrostatic experiments are omitted, as these are thought to be relatively unimportant and difficult. There is little to recommend this book when compared with some excellent introductions which have appeared in recent years.

OUR BOOK SHELF.

Animal Artizans and other Studies of Birds and Beasts. By C. J. Cornish. Pp. xxxiv+274; illustrated. (London: Longmans, Green and Co., 1907.) Price 6*s*. 6*d*. net.

THE late Mr. Cornish was a constant contributor of articles bearing upon natural history matters to the columns of the *Spectator* and *Country Life*, and the present volume, which is edited by his widow, consists mainly of a reprint of articles from those journals, with such modifications as the course of time has rendered necessary or advisable. In some cases the articles had been revised with a view to publication in book form by Mr. Cornish himself, but where this had not been done in the author's lifetime the task devolved upon the editor.

The volume opens with a brief account of the life of Mr. Cornish, which will no doubt be welcome to the numerous readers who find entertainment or instruction in his works. Following this are several articles, upon which the title of the volume is evidently based, some of these dealing with the works of such birds as the South American oven-bird and our own woodpeckers, while "road-making animals" and "landscape-gardeners" form the subjects of others. Several of these articles display a lamentable want of knowledge of scientific zoology on the part of the author. We are told, for instance, on p. 34, that "the musk-ox, the *ovibos,* is as much akin to the sheep as to *bovidae,* and in habits more like what we imagine the undescended great wild original of our sheep was than are the wild sheep of to-day." In regard to the first half of the sentence, it is now accepted that the musk-ox is not a near relative of either sheep or oxen, while the whole group is included in the Bovidæ. As to the meaning of the second half of the sentence, we are altogether in the dark. Again, on p. 48 we notice the astounding information that the pampas stag is the only large ruminant on the plains of South America, which, by the way, are stated to be formed of clay. Other similar cases might be cited, but in the case of a posthumous work criticism must not be too trenchant; and, after all, the volume is perhaps sufficiently accurate to suit the requirements of the readers to whom it is likely to appeal.

Rubber in the East. Being the Official Account of the Ceylon Rubber Exhibition held in the Royal Botanic Gardens, Peradeniya, in September, 1906. Edited by Dr. J. C. Willis, M. Kelway Bamber, and E. B. Denham. Pp. 269; illustrated. (Colombo: H. C. Cottle, Government Printer.)

THIS interesting and up-to-date work is the official account of the Ceylon Rubber Exhibition held in the Royal Botanic Gardens, Peradeniya, in September, 1906 (see NATURE, December 27, 1906, p. 209). The duration of the exhibition allowed of its being a Rubber Congress, lectures being given upon the various branches of the subject from cultivation to vulcanisation. These lectures, discussions, judges' reports, &c., have been brought together in the present volume and arranged in a logical order with the hope of making this account a standard treatise upon the rubber industry as it at present exists.

The chapters dealing with the cultivation of rubber in Ceylon and other countries, treatment of diseases, tapping knives, machinery for the treatment of latex, and the shipment and marketing of rubber, should prove valuable aids to the practical rubber grower.

Some idea of the rapid growth of the industry is gathered when we see that five years ago there were only 2500 acres under rubber in Ceylon, and to-day 104,000 acres, the *Hevea brasiliensis* being the species most extensively planted. This tree produces the well-known Para rubber, which, prepared in the ordinary way, possesses 90 to 95 per cent. of caoutchouc. The Hevea appears to stand tapping operations even when of a very drastic nature.

High tapping has been tried on some plantations up to 30ft. and 50ft., and this system gives in some cases 12lb. to 14lb. of rubber per tree; but there is

© 1907 Nature Publishing Group